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IS 12962 (1990): Data sheet for basic engineering plant design [MED 17: Chemical Engineering Plants and Related Equipment]

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संयंत्र डिजाइन की आधारभूत इंजीनियरी के लिए आंकड़ा पत्र

Indian Standard

DATA SHEET FOR BASIC ENGINEERING PLANT DESIGN

UDC 66·011:658·511·4 (083·6)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 1991

Price Group 5

Chemical Engineering Plants and Related Equipment Sectional Committee, HMD 17

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 25 May 1990, after the draft finalized by the Chemical Engineering Plants and Related Equipment Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

In a process design activity, preparation of the design format is always the first step.

The availability of, the utilities and their specifications, the raw materials and their specifications, site data, general project specifications and any special design requirements are to be provided by the purchaser.

This design format will enable the manufacturer to design the plant package based on the information provided by the purchaser.

This design format is useful not only for the chemical/petrochemical plant, but can be used for any process design activity.

If some of the utilities and instruments are already available with the purchaser, the cost of the process package will reduce if the manufacturer/licenser is informed about the availability of such utility.

Indian Standard

DATA SHEET FOR BASIC ENGINEERING PLANT DESIGN

1 SCOPE

1.1 This Indian Standard covers the design basis for any type of plant for various projects or industries, where the requirements of the purchaser are to be explicitly specified so that the manufacturer is enabled to design the system.

2 DATA SHEET

DATA SHEET FOR BASIC ENGINEERING PLANT DESIGN

1 Client/Purchaser
2 Project
3 Plant
4 Location
5 Job No.
6 Unit Capacity
6.1 Design Capacity (tonnes/year)
    a) Feed
    b) Products
6.2 No. of Stream days/h per year
6.3 Turn Down Percentage of Maximum Capacity
6.4 No. of Trains
7 Feed/Product Characteristics
7.1 Feed Stocks Characteristics
7.2 Products Characteristics
8 Feed and Product Battery Limit Conditions
8.1 Feed Stocks Bar C Source/Destination
8.2 Products Bar C Source/Destination
8.3 Storage Facilities within the Unit Battery Limit
9 Unit Optimisation Criteria
9.1 Prices of Raw Materials
9.2 Prices of Products
9.3 Prices of Utilities and Chemicals
10 Utility Specifications
10.1 Steam Minimum Normal Maximum Mechanical Design
    a) Very High Pressure Steam:
        Pressure Bar
        Temperature, °C
        Silica as SiO_2, ppm
        Total Solids, ppm
        Continuous Availability, t/h

b) High Pressure Steam: Minimum Normal Maximum Mechanical Design

Pressure Bar
Temperature, °C
Silica as SiO_2, ppm
Total Solids, ppm
Continuous Availability, t/h

c) Medium Pressure Steam:

Pressure Bar
Temperature, °C

d) Low Pressure Steam:

Pressure Bar
Temperature, °C
Continuous Availability, t/h

10.2 Instrument Air:

Pressure Bar
Dew Point, °C
Oil Content, ppm
Continuous Availability, Nm^3/h

10.3 Plant Air:

Pressure Bar
Oil Content, ppm
Continuous Availability, Nm^3/h

10.4 Water

a) Raw Water

Turbidity, ppm
M. Alkalinity, ppm
Ca Hardness, ppm as $CaCO_3$
Total Hardness, ppm as $CaCO_3$
Silica as SiO_2, ppm
Chlorides as NaCl, ppm
Sulphate as $CaCO_3$, ppm
Iron as Fe, ppm
TDS, ppm
Suspended solids, ppm
*p*H
Conductivity at 25 °C, mho/cm
Continuous availability, m^3/h

b) Cooling Water:

Supply Pressure Bar
Return Pressure Bar
Supply Temperature, °C
Return Temperature, °C
Minimum Continuous Availability, m^3/hr

c) Process water:

Pressure Bar
Temperature, °C
M. Alkalinity, ppm

Minimum Normal Maximum Mechanical Design

Turbidity, ppm
Conductivity at 25 °C, mho/cm
Hardness as $CaCO_3$, ppm
Silica as SiO_2, ppm
Sulphate as $CaCO_3$, ppm
Chloride as Nacl
TDS
pH
Minimum Continuous Availability, m^3/h

d) DM water:

Turbidity, ppm
TDS, ppm
Hardness as $CaCO_3$, ppm
Silica as SiO_2, ppm
Chlorides as NaCl, ppm
Iron as Fe, ppm
Conductivity at 25 °C, mho/cm
pH
Pressure Bar
Temperature, °C
Continuous Availability, m^3/h

10.5 Condensate

a) Very High pressure:

Pressure Bar
Temperature, °C
Vapour percentage
Oil Content, ppm
Conductivity, mho/cm

b) High Pressure Condensate:

Pressure Bar
Temperature, °C
Vapour percentage
Oil Content, ppm
Conductivity, mho/cm

c) Medium Pressure Condensate:

Pressure Bar
Temperature, °C
Vapour percentage
Oil Content, ppm
Conductivity, mho/cm

d) Low Pressure Condensate

Pressure Bar
Temperature, °C
Vapour percentage
Oil Content, ppm
Conductivity, mho/cm

10.6 Inert Gas

Pressure Bar
Temperature, °C
Purity
Oxygen Content
Dew Point/Moisture Content
CO_2 Content
CO Content
Oil Content
Continuous Availability, Nm^3/h

10.7 Hot Oil System	Minimum	Normal	Maximum	Mechanical Design
Medium				
Supply Pressure Bar				
Return Pressure Bar				
Supply Temperature, °C				
Return Temperature, °C				
Specific Gravity at, °C				
Viscosity, CP				
at, °C				
at, °C				
Sp. Heat, kcal/kg °C				
at, °C				
at, °C				
Thermal Conductivity at, °C				
Flash Point, °C				
Continuous Availability, t/h				
10.8 Fuel Oil				
Pressure Bar				
Temperature, °C				
Specific Gravity at, °C				
Viscosity CP				
at, °C				
at, °C				
Sulphur Content, ppm				
Sodium Content, ppm				
Vanadium Content, ppm				
Water Content, ppm				
Ash Content, ppm				
Sediment				
Flash point, °C				
Pour point, °C				
Heating value, kcal/kg				
Gross				
Net				
Continuous Availability, t/h				
10.9 Fuel Gas				
Pressure Bar				
Temperature, °C				
Molecular Weight				
Composition				
H_2				
Cl				
C_2				
C_3				
C_4				
C_5				
CO				
N_2				
O_2				
H_2O				
Sulphur				
Olefins				
Acetylene				
Heating Value, kcal/kg				
Gross				
Net				
Dew Point at B/L Pressure				
Minimum Continuous Availability, t/h				

10.10 Refrigeration System	Minimum	Normal	Maximum	Mechanical Design
Chilling Media				
Supply Pressure Bar				
Return Pressure Bar				
Supply Temperature, °C				
Return Temperature, °C				
Specific heat, kcal/kg, °C				
at, °C				
at, °C				
Thermal Conductivity				
at, °C				
at, °C				
Viscosity CP				
at, °C				
at, °C				
Minimum Continuous Availability PT				

10.11 Coal

Fixed Carbon
Volatile Matter
Moisture
Ash Content
Sulphur
Heating value
Gross, kcal/kg
Net, kcal/kg

Ultimate Analysis:

Carbon
Hydrogen
Oxygen
Nitrogen
Sulphur
Volatile Matter
Ash Content
Moisture Content

11 Raw Materials and Chemicals Characteristics

12 Waste Water

12.1 Storm Water Sewer provided within battery limit Yes/No

12.2 Storm Water combined with oily/process waste water Yes/No

12.3 ISBL Treatment envisaged Yes/No

12.4 Process Waste Water Continuous/Intermittent

12.4.1 If intermittent, what is the frequency/duration Gravity/Pressure

12.5 Waste Water disposal Gravity/Pressure

12.6 Floor washings to be routed to storm sewer/oily sewer Yes/No

13 Blow Down and Flare

13.1 Maximum Flare header pressure at the unit battery limit______________ Bar

13.2 Gases and Vapours with molecular wt________________________________ and below can be discharged to atmosphere

13.3 Gases and Vapours with molecular wt higher than __________shall be discharged to closed flare system only

13.4 Liquid relief system shall be separate/combined with vapour relief system

13.5 Closed liquid blow down facilities Required/Not required

13.6 Knock out drum at battery limit of each unit Required/Not required

14 Equipment Design Consideration

14.1 Vessels and Columns

14.1.1 Standard inside/outside diameters in mm

14.1.2 Limitation of dimension

	Maximum	Minimum
Diameter mm		
Length mm		
Weight kg		

14.2 Rotodynamic Machinery

14.2.1 Over Design Factor

14.2.2 Sparing Philosophy

14.2.3 Choice of Driver

14.3 Heat Exchangers

14.3.1 Design fouling factor for cooling water ________________________

$h\,m^2\,\frac{C}{Kcal}$

14.3.2 Overdesign Factor

Condensors

Coolers

Exchangers

14.3.3 Sparing Philosophy

Condensors

Coolers

Exchangers

14.3.4 Air Coolers/Exchangers

Extent to which air cooling may be used ________________________

Design dry bulb temperature °C ________________________

14.3.5 Maximum diameter of the tube bundle shall not exceed ____________ metres

14.3.6 Maximum weight of the bundle shall not exceed ____________ tonnes

14.3.7 Isolation valves across coolers and exchangers to be provided/not provided

14.4 Heaters

14.4.1 Oven design factor

14.4.2 Type of Burners

Fuel gas only/fuel oil burner only/combination burned firing fuel gas and fuel oil alternately or simultaneously to carry the full load on either fuel alone

14.4.3 Turn down ratio of heater

14.4.4 Turn down ratio of burners

14.4.5 Atomising medium

Pressure Bar

Temperature °C

14.4.6 Stack Height Limitations

Maximum Height

Minimum Height

14.4.7 Soot blowers Yes/No

If yes, choice of type Air motor/electric motor

14.4.8 End Fittings for Coils

Return bends/plug headers

14.4.9 All extended surface shall be of preferably finned/studded variety

14.4.10 Preference for decoking method steam air decoking/mechanical decoking

14.4.11 Can air pre-heating be used for fuel economy Yes/No

14.5 Valves on Piping/Equipment

Valves above what size should be:

……gear operated

……motor operated

15 Electrical Power

15.1 Incoming Power

Voltage ____________________

Frequency ____________________

No. of Feeders ____________________

Fault MVA ____________________

Voltage Variation ____________________

Frequency Variation ____________________

System of Supply Overhead lines/Underground cables

Emergency Power Yes/No

15.2 Voltage Levels

Motors	Motors	Motors	Motors
Above 1 000 kW	161-999 kW	0·18-161 kW	Up to 0·18 kW

Lighting ____________________ Instruments ____________________

Circuit Breaker Controls ____________________ Communication ____________________

No break power system required Yes/No

15.3 Special Protection Insulation to be tropicalised Yes/No

Anti-corrosive Paint for outdoor Equipment Yes/No

Anti-condensation Heater to be provided Yes/No

15.4	Motors		
	Enclosures for hazardous areas		
	Enclosures for other areas		
	Insulation class:		B/P
15.5	Illumination Levels		
16	Instrumentation		
16.1	Mode of Plant Operation	Centralised Automatic Computerised Data logging	
16.2	Type of Control	Pneumatic	Electronic
16.3	Final Control Elements	Pneumatic Others	Electric
16.4	Local Controllers	Pneumatic	Electronic
16.5	Control Room Location	Non-Hazardous Area Hazardous Area	
16.6	Status Lamps on Control Panel		
	For rotating equipment	All	Critical only
	For valves	All	Critical only
	For dampers and gates	All	Critical only
16.7	Stand Pipe for Level Instruments	Generally limited to multiple gauge glass installations	
16.8	Size of Nozzles	Independent nozzle for LG and level transmitters as per enclosed sheet	
16.9	Safety Valves Isolations		Yes/No

16.10 Control valves shall have block valves and bypass for sizes________________and below for all services and for higher sizes only due to process reasons. Every control valve without bypass shall have handwheel

16.11 Flow Integrators/Recorders on following utility headers to units required:

16.12 Flow Integrators/Recorders on following individual utility consumers required:

16.13 Flow Integrators/Recorders on following process streams entering/leaving the unit are required:

17 Site Data

17.1 Climatic Data

17.1.1 Wind velocity km/h Maximum Normal

17.1.2 Direction of prevailing wind

17.1.3 Maximum recorded rainfall

In 1 hour mm ______________________________

In 24 hours mm ______________________________

17.1.4 Earthquake design criteria

17.1.5 Design wet bulb temperature C______________________________

17.1.6 Design ambient *Min/Max* temperature °C ______________________________

17.1.7 Humidity of air at design *Max* temperature ______________________________

17.2 Unit elevation meters ______________________________ above mean sea level

17.3 Special Site Information, if any

18 General Project Specification

18.1 Numbering System to be followed

Particulars	Customer/Licensor
Units	______________________________
Equipments	______________________________
Instruments	______________________________
Documents	______________________________

18.2 List of Applicable Codes

18.3 Units of Measurements (metric/others)

18.4 Special Customer Design Requirements

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